

This listing of claims will replace all prior versions, and listings, of claims in this application:

Listing of Claims:

Claim 1 (amended): An injection module assembly comprising:

a fuel rail defining a passageway through which a fuel can flow; and

a fuel injector for delivering the fuel in the passageway to a combustion chamber of an internal combustion engine, ~~the fuel injector defining a longitudinal axis and having an outlet end and an inlet end in opposing relation along the longitudinal axis, the injector being coupled to the fuel rail at an~~ the inlet end of the fuel injector; and

an overmolding covering at least a portion of the fuel rail and at least a portion of

the fuel injector;

such that an interface between the fuel rail and the inlet end is substantially sealed to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interface.

Claim 2 (original): The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail by laser welding.

Claim 3 (original): The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail by brazing.

Claim 4 (original): The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail by TIG welding.

Claim 5 (original): The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail without using a seal ring adjacent the interface.

Claim 6 (original): The injection module assembly of claim 1, wherein the fuel injector is directly connected to the fuel rail.

Claim 7 (original): The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail via an extension tube.

21 [Claim 8 (withdrawn):

Claim 9 (cancelled):

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Claim ~~10~~ (original): The injection module assembly of claim 1, further comprising a damper inside the passageway of the fuel rail for damping pressure pulsations created by the injector.

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Claim ~~11~~ (original): The injection module assembly of claim 1, further comprising an electrical connector coupled to both the fuel rail and the injector for providing electrical power to the injector.

¹¹
Claim ~~12~~ (original): The injection module assembly of claim ~~11~~¹⁰, wherein at least a portion of the electrical connector is overmolded.

¹²
Claim ~~13~~ (original): An injection module assembly comprising:

a fuel rail defining a passageway through which a fuel can flow;

a plurality of fuel injectors for delivering the fuel in the passageway to a respective plurality of combustion chambers in an internal combustion engine, the fuel injectors being coupled to the fuel rail such that an interface between the fuel rail and each fuel injector is substantially sealed to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interface;

an electrical connector coupled to the fuel rail and to each of the injectors for providing electrical power to each injector; and

an overmolding covering at least a portion of the fuel rail, at least a portion of the electrical connector, and at least a portion of each fuel injector.

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Claim ~~14~~ (original): The injection module assembly of claim ~~13~~, wherein the fuel injectors are coupled to the fuel rail by laser welding.

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Claim ~~15~~ (original): The injection module assembly of claim ~~13~~, wherein the fuel injectors are coupled to the fuel rail by TIG welding.

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Claim ~~16~~ (original): The injection module assembly of claim ~~13~~, wherein the fuel injectors are coupled to the fuel rail by brazing.

¹⁶
Claim ~~17~~ (original): The injection module assembly of claim ~~13~~, wherein the fuel injectors are coupled to the fuel rail without using a seal ring adjacent the interface.

Claim ¹⁷~~18~~ (original): The injection module assembly of claim ¹²~~13~~, further comprising a damper inside the fuel rail for damping pressure pulsations created by the injectors.

Claim ¹⁸~~19~~ (original): The injection module assembly of claim ¹²~~13~~, wherein the fuel injectors are directly connected to the fuel rail.

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Claim ¹⁹~~20~~ (original): The injection module assembly of claim ¹²~~13~~, wherein the fuel injectors are coupled to the fuel rail via an extension tube.

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Claim ²⁰~~21~~ (withdrawn):

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Claim ~~22~~ (original): A method of manufacturing an injection module assembly having a fuel rail, a plurality of fuel injectors, and an electrical connector, the method comprising:

coupling the fuel injectors to the fuel rail such that respective interfaces between the fuel rail and the fuel injectors are substantially sealed to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interfaces;

coupling the electrical connector to the fuel rail and to each of the injectors to provide electrical power to the injectors; and

overmolding at least a portion of the fuel rail, at least a portion of the electrical connector, and at least a portion of each injector to form an injection module assembly.

a1 Claim ²²~~23~~ (original): The method of claim ²¹~~22~~, wherein the injectors each define a longitudinal axis and have an outlet end and an inlet end in opposing relation along the respective longitudinal axis, and wherein each injector is coupled to the fuel rail at the inlet end.

Claim ²³~~24~~ (original): The method of claim ²¹~~22~~, wherein the injectors are coupled to the fuel rail by one of laser welding, TIG welding, and brazing.

Claim ²⁴~~25~~ (original): The method of claim ²¹~~22~~, wherein the fuel injectors are coupled to the fuel rail without using a seal ring adjacent the interface.

Claim ²⁵~~26~~ (original): The method of claim ²¹~~22~~, further comprising inserting a damper into the fuel rail for damping pressure pulsations created by the injectors.

²⁶
Claim ~~27~~ (new): An injection module assembly comprising:

a fuel rail defining a passageway through which a fuel can flow;

a plurality of fuel injectors for delivering the fuel in the passageway to a respective plurality of combustion chambers in an internal combustion engine, the fuel injectors being coupled to the fuel rail at respective interfaces; and

an overmolding covering at least a portion of the fuel rail and at least a portion of each fuel injector;

wherein the interfaces between the fuel rail and each fuel injector are substantially sealed to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interfaces.

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Claim ~~28~~ (new): The injection module assembly of claim ²⁶~~27~~, further comprising an electrical connector coupled to the fuel rail and to each of the injectors for providing electrical power to each injector, and wherein at least portion of the electrical connector is covered by the overmolding.

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Claim ~~29~~ (new): The injection module assembly of claim ²⁶~~27~~, wherein the fuel injectors are coupled to the fuel rail by one of laser welding, TIG welding, and brazing.

²⁹
Claim ~~30~~ (new): The injection module assembly of claim ²⁶~~27~~, wherein the fuel injectors are coupled to the fuel rail without using a seal ring adjacent each interface.

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Claim ~~31~~ (new): The injection module assembly of claim ²⁶~~27~~, wherein the fuel rail is metallic.

³¹
Claim ~~32~~³¹(new): A method of manufacturing an injection module assembly having a fuel rail and a plurality of fuel injectors, the method comprising:

coupling the fuel injectors to the fuel rail at respective interfaces; and
overmolding at least a portion of the fuel rail and at least a portion of each injector.

³²
Claim ~~33~~³²(new): The method of claim ~~32~~³¹, further comprising:


coupling an electrical connector to the fuel rail and to each of the injectors to provide electrical power to the injectors; and
overmolding at least a portion of the electrical connector.

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Claim ~~34~~³³(new): The method of claim ~~32~~³¹, wherein coupling the fuel injectors to the fuel rail at respective interfaces is intended to substantially seal the respective interfaces to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interfaces, and wherein overmolding at least a portion of the fuel rail and at least a portion of each injector provides added sealing in the event the interfaces are not completely sealed by the coupling.

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Claim ~~35~~³⁴(new): The method of claim ~~32~~³¹, wherein the fuel injectors are coupled to the fuel rail by one of laser welding, TIG welding, and brazing.

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Claim ~~36~~³⁵(new): The method of claim ~~32~~³¹, wherein the fuel injectors are coupled to the fuel rail without using a seal ring adjacent the interface.

³⁶
Claim ~~37~~ (new): The injection module assembly of claim 1, wherein the fuel injector defines a longitudinal axis and includes an outlet end and the inlet end in opposing relation along the longitudinal axis.

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Claim ~~38~~ (new): The injection module assembly of claim 1, wherein the fuel rail is metallic.

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Claim ~~39~~ (new): The injection module assembly of claim ¹²~~13~~, wherein the fuel rail is metallic.
